UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/612,763	06/30/2003	Kaustubh Das	884.934US1	5912

21186   7590   06/28/2007

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ART UNIT	PAPER NUMBER
2134	

MAIL DATE	DELIVERY MODE
06/28/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

	Application No.	Applicant(s)
Office Action Summary	10/612,763	DAS ET AL.
	Examiner	Art Unit	
	David Y. Jung	2134	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on _____.
2a) ☒ This action is **FINAL**.   2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☐ Claim(s) _1-26_ is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☐ Claim(s) _1-26_ is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on _____ is/are: a)☒ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All   b)☐ Some * c)☐ None of:
      1.☐ Certified copies of the priority documents have been received.
      2.☐ Certified copies of the priority documents have been received in Application No. _____.
      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

CLAIMS PRESENTED

Claims 1-26 are presented.

Response to Arguments

Applicant's arguments filed have been fully considered but they are not persuasive.

Regarding the prior art of record (Frantzen), the most poignant sentence of Frantzen appears to be that of the third paragraph of section 1. Introduction:

> Knowledge of what buffer flows are [12], their relevance to security exploits [1, 13] and why they occur is a prerequisite to understanding this paper.

The papers that Frantzen numbered and cited (12, 1, 13) can be found in the bibliography of Frantzen. These papers are in no way particularly extraordinary. Rather, they are merely what is ordinary skill in the art and is even stated by Frantzen as "a prerequisite" to understanding Frantzen. Thus, the Office assumes the prerequisite.

Applicant argued that there is no way that Frantzen could reasonably point to virus handlings of the claimed invention. Yet, the buffer flows, their relevance to security exploits, and why they occur is the very prerequisite of the subject matter of Frantzen. These buffer flows are how viruses attack at a processor level. Thus, Applicant's arguments are not persuasive.

Applicant also argued that Frantzen could not reasonably teach protection at processor instruction level. This cannot be. Frantzen explicitly mentions that Sun Sparc was chosen for the very purpose of stack handling. Solaris, the operating system most associated with Sparc, has supported globally disabling stack execution on Sparc processors since Solaris 2.6 (1997). In Solaris 9 (2202), support for disabling stack execution on a per-executable basis was added. This stack handling is the direct competing feature to Intel's XD bit and AMD's NX bit. See, for further information, Wikipedia article on NX bit (cited in the previous Office Action). Thus, Applicant's arguments are not persuasive.

Indeed, Applicant's reading of Frantzen must be considered either an intentionally narrow reading or perhaps even a mistaken reading. Applicant cited (at page 7 of the outstanding Response to Office Action) a paragraph of Frantzen which seems to refer to "deep function calls" according to Applicant. Even in that very paragraph of Frantzen, there is no statement limiting the situation to deep function calls. Actually, Frantzen (the author) discussed an improvement over what Frantzen considered an obvious, trivial implementation. Sparc (the processor Frantzen discusses regarding stacks) already had disabling of stack execution. Thus, the obvious, trivial implementation would have been protection at the "point of individual function calls" as Applicant phrased. Frantzen's discussion of improvement does not mean that the prior art no longer existed after having existed, merely that Frantzen found an improvement.

Thus, the rejections must stand. Applicant is respectfully requested either to amend claims or to provide further arguments or otherwise appropriately respond.

CLAIM REJECTIONS

Claim Rejections - 35 USC § 102

Claims 1-7, 10-11, 13-17 are rejected under 35 U.S.C. 102(b) as being

anticipated by Frantzen (Frantzen, Shuey, StackGhost: Hardware Facilitated Stack

Protection, Proceedings of the 10th USENIX Security Sympsium, August, 2001).

Frantzen teaches:

Clam 1: A processor comprising:

a plurality of functional units (Section 2.1 Conventional function calls, i.e.

function calls), including a first functional unit and a second

functional unit, the first functional unit to receive instructions, to

determine whether ones of the instructions are associated with a

virus, and to transmit the ones of the instructions not associated with

the virus to the second functional unit (section 1 Introduction, i.e., solution

to attacks – the first paragraph, Sparc return address handlings – the second

paragraph).

Claims 2-6: various virus detection and handling (section 1 Introduction, i.e.,

solution to attacks – the first paragraph, Sparc return address handlings – the second

paragraph).

Claim 7: apparatus, etc, (section 1 Introduction, i.e., solution to attacks – the first

paragraph, Sparc return address handlings – the second paragraph). ·

Claims 10-11, 13-17: various virus detection and handling (section 1 Introduction,

i.e., solution to attacks – the first paragraph, Sparc return address handlings – the

second paragraph).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 8-9, 12, 18-26 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Frantzen (Frantzen, Shuey, StackGhost: Hardware Facilitated Stack Protection,

Proceedings of the 10th USENIX Security Sympsium, August, 2001).

Claims 8-9, 12, 18-26 recite "virus signatures."

Regarding Claims 8, Frantzen teaches as noted in the previous paragraphs.

These passages of Frantzen do not teach "virus signatures" handling in

processor hardware in the sense of the claim.

Frantzen does teach use of the return address stack (section 3.4). This permits

the use of hash table as noted in Frantzen (section 3.4). Frantzen does suggest Non-

Exec pages (section 7.5). These approaches, such as Sun's non-executable stack

(mentioned in section 7.5, albeit only a mention and not explicit discussion) are, of course, now standard features in almost all 64-bit processors. These features, such as return address stack handlings, permit handling of virus signatures (see the fourth paragraph of section 3.4 which shows comparing the random number on the stack so as to find an exploit – a virus signature).

Thus, it was well known in the art to use stack handlings (e.g., non-executable stack) for the motivation of virus protection.

Hence, it would have been obvious to those of ordinary skill in the art at the time of the claimed invention to modify Frantzen for the motivation noted in the previous paragraphs so as to teach the claimed invention.

Other than "virus signatures", Frantzen teaches other features of claims 9 (authentication), 12 (comparing instructions, etc.): (see the fourth paragraph of section 3.4 which shows comparing the random number on the stack so as to find an exploit – a virus signature).

Other features of claims 18-20 (instruction cache, etc.) are well known in the art for the motivation of performance enhancement.

Other features of claims 21-26 (memory hardware, etc.) are well known in the art for the motivation of information storage.

Conclusion

The art made of record and not relied upon is considered pertinent to applicant's disclosure. The art disclosed general background.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Points of Contact

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(571) 273-8300, (for formal communications intended for entry)
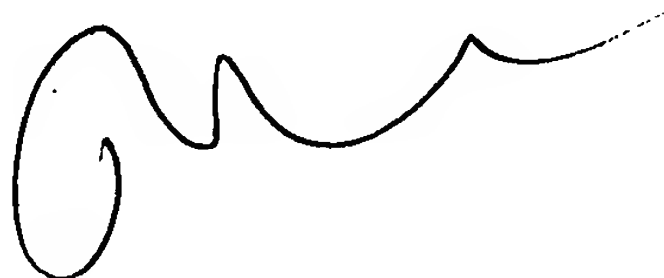
Or:

(571) 27<u>3</u>-3836 (for informal or draft communications, please label "PROPOSED" or "DRAFT")

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Jung whose telephone number is (571) 27<u>2</u>-3836 or Kambiz Zand whose telephone number is (272) 272-3811.

David Jung

Patent Examiner

6/23/07